UDC 621·51

IS : 6430 - 1985

(Reaffirmed 2001)
(Reaffirmed 2012)

Indian Standard

SPECIFICATION FOR MOBILE AIR COMPRESSOR FOR CONSTRUCTION PURPOSES

(First Revision)

1. Scope — Covers general requirements and performance of internal combustion-engine or electric-motor-driven mobile air compressor plants with positive displacement which include reciprocating, rotary and screw type compressors for construction purposes with pressure up to 20 bar. The requirements of the standard shall also apply to wheel and skid-mounted plants.

1.1 This standard does not cover the truck-mounted or self-propelled compressors driven by prime mover of the vehicle itself.

2. Terminology

2.1 For the purpose of this standard, the definitions given in IS : 5727-1981 'Glossary of terms relating to compressors and exhausters (*revised*)' shall apply.

2.2 *Mobile Compressor* — A compressor mounted on a trailer which can be towed by a vehicle at speeds and conditions specified in this standard; or a skid-mounted compressor which can be lifted along with the skid and bolted on to a trailer which can be towed by a vehicle at speeds and conditions specified in this standard.

Note — The definition in 2.2 does not include trolley-mounted small inflating units, which are not covered by this standard.

3. Material — All materials and components used in the manufacture and construction of the mobile air-compressors shall be in accordance with the good engineering practice and as far as possible shall conform to the requirements of relevant Indian Standards.

4. Designation of Sizes — The size of the compressor shall be specified by its capacity in terms of free air delivered at the specified working pressure.

5. Operating and Storage Conditions — The machine shall be capable of operation and storage in the environments as given in 5.1 to 5.3.

5.1 *Temperature* — The compressor shall normally be capable of working and being stored without any defect at temperature 5 to 45°C when the prime mover is an electric motor or an internal combustion engine.

5.1.1 If so required by the purchaser, the compressor shall be capable of working at temperature other than specified above.

5.2 *Humidity* — The compressor shall be suitable for operation at 95 percent relative humidity at all temperatures below 27°C ambient. At and above this temperature, the machine shall be suitable for relative humidity, not in excess of that corresponding to 30 mm of mercury.

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5.3 *Altitude* — The machine shall be capable of giving its rated output up to 300 m altitude. If the machine is to run at higher altitudes the derating factor shall be given by the supplier. If specially required by the purchaser, the engine shall be capable of running at the rated speed and load at higher altitudes up to and including 4 200 m.

6. Performance

6.1 *Output* — The compressor shall be capable of delivering specified free air flow at rated discharge pressure measured in accordance with IS : 5456-1969 'Code of practice for testing of positive displacement type air compressors and exhausters'.

6.2 *Air Temperature* — The manufacturer shall indicate the rise in temperature (above the intake temperature of the discharged air) measured at outlet of compressed air receiver, when the compressor is working at full load under normal working conditions.

Compressors Sectional Committee, EDC 62; Test for Air Compressor Subcommittee, EDC 62 : 2 [Ref : Doc : EDC 62 (3953)]

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6.3 *Coolant Temperature* — In case of engine driven compressor under continuous full load conditions, the temperature of the coolant in the radiator header tank shall be lower than the boiling point of the coolant by at least 7°C.

Note — The boiling point of water will be higher when pressurized cap is used.

6.4 *Oil Temperature* — The temperature of the oil in compressor and engine shall not exceed 120°C when the plant is running continuously at full load.

6.5 *Mobility* — The samples of the mobile compressor as defined in **2.2** selected in accordance with **6.5.2** shall pass the type test as described in **6.5.1**.

6.5.1 The mobile compressor shall traverse 80 km on a rough cross country road at a speed of not less than 15 km/h without damage to its any component and without in any way affecting its performance.

Note — Eighty kilometres run on a rough cross country road need not be a continuous run.

6.5.2 Unless otherwise agreed to between the purchaser and the supplier, the number of samples for the mobility test may be one in twenty with a minimum of one for consignments of less than twenty and more than five. For consignments of less than five the manufacturer shall give a certificate that the mobile compressor fulfils the requirements of the type test in **6.5.1**.

6.6 *Operating Angle* — The plant shall be capable of operating satisfactorily even when tilted at an angle of one in seven in any direction.

7. Air Compressor — The air compressors shall meet the requirements as given in **7.1** or **7.2**.

7.1 *Oil Flooded Rotary Vane and Screw Types* — The compressor shall be of one or two stages and shall conform to the requirements as given in **7.1.1** to **7.1.4**.

7.1.1 *Oil system* — The compressor oil system shall be self-priming and shall incorporate an element type filter, easily accessible and with a minimum life of 100 hours. The system shall be so arranged that oil shall automatically by-pass the filter in the event of a restriction. An oil contents gauge or dip-stick shall be supplied and there shall be a means of adequately draining the system.

7.1.2 *Air output control* — This shall be done by engine speed control and suction unloading; for electric motor run compressors, it shall be with suction unloading only. The engine speed shall be within the limits recommended by the engine manufacturers. The air output control shall give a maximum pressure differential of 1 kg/cm^2 between full output and no flow, this pressure being measured at inlet to the receiver connection. The control shall be adjustable to give the rated capacity at any discharge pressure up to 1·5 kg/cm^2 below the rated pressure of the compressor. All moisture filters in the air system shall be rustproof and easily accessible.

7.1.3 *Discharge pressure control* — For the proper functioning of the compressor, necessary device shall be fitted to maintain an adequate air pressure in any receiver even if air cocks are fully open.

7.1.4 *Automatic shut down devices* — Automatic shut down devices shall be fitted, if required by the purchaser.

7.2 *Reciprocating Type* — Reciprocating type compressor shall conform to the requirements given in **7.2.1** to **7.2.3**.

7.2.1 *Lubricating system* — The compressor shall have suitable lubrication system to give adequate lubrication under all starting and climatic conditions. The lubricating system shall incorporate an oil filter easily accessible. If so required by the purchaser, the system shall be so arranged that oil shall automatically by-pass the filter and the oil cooler (if fitted), in the event of a restriction in either of these components. Means shall be provided for isolating the oil cooler (if fitted); alternatively automatic shut-down device shall be provided. Easily accessible drain points shall be provided for draining all lubricant. An oil contents gauge or dipstick shall be provided for measuring the level of the oil in the crankcase.

7.2.2 The compressor shall be fitted with an automatic device to maintain the pressure in the air receiver between the limits of rated pressure. If required by the purchaser, an automatic pressure operated control shall be incorporated to reduce the engine speed and unload the compressor.

7.2.3 *Water cooling system* — In the case of water cooled machines the cooling system may be combined with that of the engine. If a separate cooling system is used it shall conform to the requirements as given in **7.2.3.1** to **7.2.3.4**.

7.2.3.1 The system shall be so arranged that when the plant is shut down, water circulation shall be maintained by thermosyphone.

7.2.3.2 In case of internal combustion engine driven compressors, it is recommended that a thermostat by-pass valve is incorporated in the system.

7.2.3.3 The radiator may, at the request of user, be fitted with adjustable doors or shutters, whereby the operating temperature of the engine may be maintained at a satisfactory figure when the plant is running at temperatures down to —13°C.

7.2.3.4 Easily accessible drain points (either drain cocks or drain plugs) shall be provided in order to drain the system completely without tilting or dismantling the plant. Drain-cocks shall be closed when the handles are in the down position.

8. Air Receiver — The requirements of air receiver shall be as agreed to between the purchaser and the manufacturer.

9. Prime Mover

9.1 The prime mover shall be either an electric motor conforming to relevant Indian Standards or an internal combustion engine conforming to IS : 10001-1981 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purpose (up to 20 kW)' and IS : 10002-1981 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (above 20 kW)'. The prime mover shall meet the power demand of the compressor under conditions as specified in 5. Provision shall be made to measure the speed by tachometer.

9.2 The compressor unit shall be provided with the following :

a) Running hour recorder, when so required by the purchaser;
b) Revolution meter, when so required by the user;
c) Exhaust to be so arranged as to avoid contamination of air inspired by the compressor and the engine;
d) The engine exhaust silencer, so designed and fitted that the noise level should be limited to 75 dB at 7 m distance; and
e) A cold starting device shall be supplied with the prime mover when the compressor is to operate at temperature below 5°C.

9.3 *Starting System* — The internal combustion engine shall be provided with an electric or hydraulic or spring starting gear. The electric starter when provided shall be on 12 V/24 V electric system. Hand starting arrangement may be provided as an alternative to electric or hydraulic or spring starting gear for engines up to 22·5 kW.

9.4 In the case of an electric motor being the prime mover, the following shall be provided :

a) Starter with overload relay trip and no volt coil;
b) Voltmeter (optional);
c) Ammeter;
d) Running hour recorder, when so required by the purchaser;
e) Tachometer (optional); and
f) Suppression of radio interference (optional).

10. Mounting

10.1 The compressor, prime mover and the air receiver shall be mounted either on a trailer of sound design or a skid capable of being fitted on a trailer (*see* 2.2). The compressor and prime-mover shall also be mounted on a tabular frame forming an air receiver of sound design and capable of taking the entire load.

10.2 *Trailer Mounting* — The trailer shall have pneumatic or solid rubber wheels with 1 or 2 axles as agreed to between the user and the manufacturer. When the compressor is mounted on a trailer, the following shall be ensured.

10.2.1 *Centre of gravity* — The fully laden plant shall not overturn on its near or off side when mounted on a tilting platform, tilted laterally to an angle of 15°.

If so agreed to between the purchaser and the supplier, as a special requirement the fully-laden plant shall not overturn on to its near or off side when mounted on a tilting platform, tilted laterally to an angle of 30°.

Note 1 — The requirements in **10.2.1** shall not necessarily mean that the plant shall be capable of operating under the conditions mentioned in **10.2.1**. The plant shall be capable of operating satisfactorily at an angle as indicated in **6.6**.

Note 2 — The requirements in **10.2.1** shall not be considered as 'routine test'. Normally the manufacturer's certificate guaranteeing the performance in accordance with **10.2.1** shall suffice, but where specifically required by the purchaser a type test may be done in accordance with **6.5.2**.

18. Dismantability

18.1 During design, consideration may be kept for a purchaser's requirement who wants the plant to be made dismantable into convenient independent small loads, as mutually agreed upon by the purchaser and the manufacturer, for transportation in inaccessible areas.

18.1.1 The plant shall be capable of being dismantled easily in short time by ordinary hand tools and shall not require any special tools or equipment for that purpose.

19. Test on Compressors — For acceptance, the compressors shall be tested in accordance with IS : 5456-1969 'Code of practice for testing of positive displacement type air compressors and exhausters' and methods of tests agreed to between the purchaser and the manufacturer, as applicable.

20. Documents

20.1 A copy of operating and maintenance manual illustrated parts list shall be provided along with each unit.

20.1.1 If required by the purchaser, the workshop manual shall specify the working limits for the dimensions of all important moving or wearing parts of the compressor, beyond which the parts shall be replaced.

21. Marking

21.1 *Information Plate* — An approved information plate or plates, permanently and clearly marked with the following information, shall be fitted to each plant:

a) Maker's name, type and serial number;
b) Rated output; and
c) Rated pressure.

21.2 Coolant drain-cocks shall be suitably identified in a conspicuous and permanent manner. An arrow and the words 'DRAIN-COCK' shall be painted on a prominent part of the plant to indicate the position of the drain-cocks.

EXPLANATORY NOTE

This standard was first published in 1972 by the Construction Plant and Machinery Sectional Committee (EDC 28) of the Civil Engineering Department. The subject was later on transferred to Compressors Sectional Committee (EDC 62) of Mechanical Engineering Department.

Mobile air compressors are extensively used on construction projects for rock drilling, excavation tools, riveting, pile driving hammers, concrete vibrators pumps and a number of portable tools. They are also used for work in pneumatic caissons and tunnels and provide the pressure for foundation grouting. They may be used in combination with water or sand for cleaning rock, concrete or steel surfaces. In view of the increasing use of air compressors on construction sites as a result of greater mechanization in construction industry, it has been considered necessary to lay down standards for mobile air compressors for construction purpose.

The first version of the standard was prepared with the following objectives:

a) To guide the purchaser and the manufacturer by specifying working limits for capacity, general construction and other features of machine; and
b) To guide the purchaser in obtaining machines with some guaranteed performance.

This revision has been taken up to keep the standard abreast ofmodern manufacturing techniques. The main changes made in the standard are:

a) A unified temperature range of 5 to 45°C has been specified for both electric motor as well as IC engine driven compressor in **5.1.1**.

   The previous ranges were 0 to 40°C for electric driven compressors and 0 to 45°C for IC engine driven compressors.
b) Reference to IS : 10000, IS : 10001 and IS : 10002 has been made in place of IS : 1601 which has been withdrawn.
c) The temperature of '12°C' has been modified to '7°C' in **6.3.**
d) The temperature of —13°C has been substituted for —9·4°C in **7.2.3.3.**

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(First Revision)

[*Page* 3, *clause* **9.2**(d)] — Delete.

(*Page* 3, *clause* **9.2**) — Insert the following new clauses:

"**9.2.1** To keep more pollution under control, it is desirable that the noise level of compressor unit may be 75 dB + 3 at 7 m distance. Actual noise level shall be specified by the manufacturer.

9.2.2 IS 11446 : 1985 'Measurement of airborne noise emitted by compressors units intended for outdoor use' shall be followed for the measurement of noise level of the compressor unit."

(*Page* 4, *clause* **12.1**, *last sentence*) — Substitute the following for the existing sentence:

'The fuel gauge calibrated in litres, shall be fitted in the tank on the base panel as agreed to between the purchaser and the manufacturer."

[*Page* 5, *clause* **15.1**(b)] — Substitute the following for the existing item:

'Capillary dial type thermometers of dial size not less than 50 mm for recording engine cooling water temperature.'

(*Page* 5, *clause* **15.5**) — Substitute the following for the existing clause:

'All pressure gauges shall be of automotive type.'

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(*Page* 3, *clause* **9.1**) — Substitute the following for the existing clause:

"**9.1** The prime mover shall be either an electric motor conforming to relevant Indian Standards or an internal combustion engine conforming to IS 10001:1981 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purpose (up to 20 kW)' or IS 10002 : 1981 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (above 20 kW)' or variable speed compression ignition (diesel) engine as agreed to between the manufacturer and the purchaser. The prime mover shall meet the power demand of the compressor under conditions as specified in **5**. Provision shall be made to measure the speed by tachometer."

[*Pages* 4, *clause* **12.1**, *last sentence* (*see also Amendment No*. 1)] — Substitute the following for the existing sentence:

'A fuel gauge, indicating refill level and maximum level, shall be fitted in the tank on the base panel as agreed to between the manufacturer and the purchaser.'

(HMD 22)

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